

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-319740

(43)Date of publication of application : 24.11.1999

(51)Int.Cl.

B08B 5/00

(21)Application number : 10-130408

(71)Applicant : RICOH CO LTD

(22)Date of filing : 13.05.1998

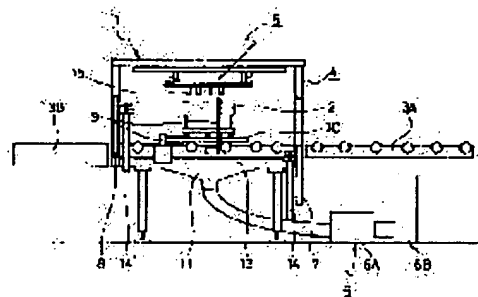
(72)Inventor : ARAAKI MASAHARU

## (54) DUST REMOVAL DEVICE

## (57)Abstract:

PROBLEM TO BE SOLVED: To remove efficiently dust of a small particle size stuck to an assembly body by a method wherein air of a specific pressure is intermittently jetted to the assembly body from an air nozzle, and dust flying up in the air from the assembly body by the air-jetting is sucked.

SOLUTION: An air jetting means 5 is fixed above a dust removal chamber 4, six lines of air nozzles 15 as one set for four nozzles, are provided to the air jetting means 5, and air of a higher pressure than a positive pressure is jetted to an assembly body 2 from those air nozzles 15. Dust stuck to a surface of the assembly body 2 is allowed to fly up in the air by the jetting, and a large dust of at least 20  $\mu\text{m}$  in particle size having been allowed to fly up is removed through a suction duct 11 by a sucking means 6. Then, the dust included in the removed air is removed by an attracting electrostatic filter 6B, and the clean air is discharged to the outside.



## LEGAL STATUS

[Date of request for examination]

11.09.2002

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

3501343

[Date of registration]

12.12.2003

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

BEST AVAILABLE COPY

Copyright (C); 1998,2003 Japan Patent Office

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

[Claim 1] The dust stripper equipped with an Ayr injection means to inject Ayr of a predetermined pressure from an air jet hole intermittently to said assembly in order to blow away the dust adhering to an assembly, and a suction means to attract the dust danced in the air from said assembly by the Ayr injection.

[Claim 2] Said suction means is a dust stripper according to claim 1 characterized by preparing suction opening of said suction means under said assembly in order to attract the dust which floats to the relaxation time of said Ayr injection.

[Claim 3] The dust removal room isolated in said assembly to a perimeter in order to remove the dust adhering to said assembly, The door for carrying in opened and closed when carrying in said assembly to said dust removal room, A dust stripper [ equipped with the door for taking out opened and closed when taking out said assembly from said dust removal room, and carrying-in / taking-out means for carrying in and taking out said assembly at said dust removal room ] according to claim 1 or 2.

[Claim 4] The dust stripper according to claim 3 characterized by having an open air inhalation means to introduce the purified exterior air and to maintain said dust removal room to positive pressure.

[Claim 5] Said Ayr injection means is a dust stripper according to claim 1 or 2 characterized by weakening the adhesion force of the dust which was made to neutralize the dust adhering to said assembly electrically, and adhered to said assembly by injecting ionized Ayr to said assembly.

[Claim 6] Said suction means is a dust stripper according to claim 1 or 2 characterized by attracting said dust only to the relaxation time of said Ayr injection.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the dust stripper for removing the dust adhering to the precision mechanical equipment as an assembly.

[0002]

[Description of the Prior Art] As an assembly (for example, like manufacture and the erector of a precision mechanical equipment), in order to raise the reliability of a finished product, and the engine performance, the dust with a particle size of 20 micrometers or more which set like manufacture and an erector and adhered to the assembly is removed from the former. For example, CCD of high resolution is used for the lens unit 21 of the reading section 20 roughly shown in drawing 3 in precision optical instruments, such as a copying machine. When dust had adhered to the movable mirror 22 of this reading section 20 and a manuscript is read, image formation of the dust with a particle size of 20 micrometers or more adhering to the movable mirror 22 is carried out to 1-dimensional Rhine CCD of the lens unit 21, muscle-like stripes occur in a duplication, and there is a problem that manuscript reading quality deteriorates. Therefore, before equipping with the contact glass which omits illustration like the erector of the reading section 20, in order to remove the dust adhering to the movable mirror 22 and the lens unit 21 While blowing away the dust which injected Ayr of a constant pressure continuously on the front face of the movable mirror 22, and the front face of the objective lens of the lens unit 21, and adhered to the movable mirror 22 and the lens unit 21 He attracts the dust danced in the air, and is trying to remove dust as much as possible from an assembly.

[0003]

[Problem(s) to be Solved by the Invention] By the way, in order to aim at much more improvement in reading precision recently, the demand which also removes a thing with a particle size of less than 20 micrometers as much as possible is increasing. However, there is un-arranging [ which less than 20-micrometer dust cannot ride the flow of the air by the suction means easily in the dust removal by the conventional Ayr continuation injection, it is not easily attracted by the suction means since it will be in the condition ride on the eddy (turbulent flow) of the air which the dust danced in the air produces by the Ayr injection, and float the air of the assembly upper part, but particle size falls toward an assembly again, and adheres ].

[0004] This invention was made in view of the above-mentioned situation, and aims at offering the dust stripper which can remove efficiently the dust with a small particle size adhering to an assembly.

[0005]

[Means for Solving the Problem] In order to blow away the dust with which the dust stripper of claim 1 adhered to the assembly in order to attain this purpose, it has an Ayr injection means to inject Ayr of a predetermined pressure from an air jet hole intermittently to said assembly, and a suction means to attract the dust danced in the air from said assembly by the Ayr injection.

[0006] In the dust stripper of claim 1, the dust stripper of claim 2 is characterized by preparing suction opening of said suction means under said assembly, in order to attract the dust which floats for said suction means at the relaxation time of said Ayr injection.

[0007] The dust stripper of claim 3 is set to a dust stripper according to claim 1 or 2. The dust removal room isolated in said assembly to a perimeter in order to remove the dust adhering to said assembly. It has the door for carrying in opened and closed when carrying in said assembly to said dust removal room, the door for taking out which are opened and closed when taking out said assembly from said dust removal room, and carrying-in / taking-out means for carrying in and taking out said assembly at said dust removal room.

[0008] The dust stripper of claim 4 is characterized by having an open air inhalation means to introduce the purified exterior air and to maintain said dust removal room to positive pressure in a dust stripper according to claim 3.

[0009] In a dust stripper according to claim 1 or 2, by injecting Ayr where said Ayr injection means was ionized to said assembly, the dust stripper of claim 5 neutralizes the dust adhering to said assembly electrically, and is characterized by weakening the adhesion force of the dust adhering to said assembly.

[0010] The dust stripper of claim 6 is characterized by said suction means attracting said dust only to the relaxation time of said Ayr injection in a dust stripper according to claim 1 or 2.

[0011] Since it decided to turn Ayr to an assembly intermittently and to inject it according to invention according to claim 1 to 6, the condition that there is no turbulence of the air produced by the Ayr injection can be repeated to the Ayr injection relaxation time, and it can be made to generate, therefore it will put on the flow of the air by the suction means, and dust can be attracted.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained based on a drawing.

[0013] For 1, in drawing 1 and drawing 2, a dust stripper body and 2 are [ the conveyor for conveyance as a carrying-in / taking-out means of an assembly and 3C of an assembly, and 3A and 3B ] pallets. Here, through a predetermined process, the assembly \*\*\*\* assembly 2 is put on pallet 3C, and is carried toward the dust stripper body 1 by conveyor 3A for conveyance. The suction means 6 for attracting the dust danced in the dust removal room 4, an Ayr injection means 5 to inject Ayr of a predetermined pressure, and the dust removal room 4 as shown in the dust stripper body 1 at drawing 2 is established.

[0014] The suction duct 11 which leads to the door 7 for carrying in, the door 8 for taking out, the carrying-in object detector 9, the open air inhalation means 10, and the suction means 6 is formed in this dust removal room 4. This door 7 for carrying in and the door 8 for taking out are opened and closed by the cylinder 14 for door closing motion, and 14'.

[0015] The open air inhalation means 10 is installed in the side of the dust removal room 4. This open air inhalation means 10 is equipped with the electrostatic filter 12, the open air is sent into the dust removal room 4 from open air inhalation opening which omits illustration by the fan for open air inhalation, and dust is removed by the electrostatic filter 12 in that case. By installation of this open air, the dust removal room 4 is maintained at a pressure [ a little ] higher than an outside atmospheric pressure, i.e., positive pressure, and even if it does not make the dust removal room 4 into an airtight structure, external dust can maintain it at the condition of not trespassing upon the dust removal room 4.

[0016] As for the suction duct 11, it is caudad prepared in the dust removal room 4. It is opened for free passage by the suction means 6, this suction duct 11 being used as the trumpet configuration which goes caudad and by which the diameter of the opening area of suction opening was reduced. The suction means 6 has motor 6A for suction, and electrostatic filter 6B for suction. In order to prevent turbulence of the air at the time of suction near the suction duct 11, the straightening vane 13 is formed.

[0017] The flow of fixed air is made in the dust removal room 4 by the inflow of the air by the open air inhalation means 10, and discharge of the air by the suction means 6. Removal of dust is performed by putting the dust which drifts the air with the flow of this air. Here, it is considering as the flow of the air of wind-speed (rate of flow) 1.2 m/s - 1.8 m/s.

[0018] In the dust removal room 4, the carrying-in object detector 9 the existence of a carrying-in object and for the check of a carrying-in location is formed. The door 7 for carrying in will be

closed if the assembly 2 having been carried in normally and having stood it still in the predetermined location is detected by the carrying-in object detector 9.

[0019] The Ayr injection means 5 is being fixed above the dust removal room 4. An air jet hole 15 makes four a lot here, and Ayr of a pressure higher than positive pressure is injected to an assembly 2 by this Ayr injection means 5 from 6 successive-installation eclipse \*\*\*\*\* and this air jet hole 15. In which abbreviates illustration to the Ayr injection means 5 -- NAIZA is prepared, by making + and - ionize Ayr injected, dust is neutralized electrically and the adhesion force of the dust adhering to the front face of an assembly 2, for example, the front face of the movable mirror 22, and the front face of the objective lens of the lens unit 21 is weakened. Here, Ayr of a pressure higher than the ionized positive pressure is injected from an air jet hole 15 to an assembly 2 by the 24m [ a maximum of //s ] rate of flow. This injection is intermittent, and in order to maintain positive pressure for the inside of the dust stripper 4 in cooperation with the open air inhalation means 10 at injection relaxation time, the 2m of the rates of flow/and about s Ayr are sent out from an air jet hole 15.

[0020] If Ayr of a pressure higher than positive pressure is injected by the assembly 2, the dust which adhered to the front face of an assembly 2 by this Ayr will have danced in the air. Since this Ayr is ionized, the dust adhering to the front face of an assembly 2 serves as neutrality electrically, and it becomes easy to separate it from the front face of an assembly 2. The time of generating of the eddy of the air according [ comparatively big dust 20 micrometers or more ] to the Ayr injection in the particle size danced in the air by this Ayr injection also rides the flow of the air by the suction means 6, and it is easy to sediment, and is removed by the suction means 6 through the suction duct 11 prepared in the lower part of the dust removal room 4. Although there is much what particle size rides on the eddy of the air which produces less than 20-micrometer dust by injection, floats, and does not descend easily, if the Ayr injection by the Ayr injection means 5 is stopped and the eddy of air is extinguished, the flow of the fixed air produced with the open air inhalation means 10 and the suction means 6 will be ridden, and it will pass along the suction duct 11, and will be recovered by the suction means 6. Then, next Ayr injection is performed.

[0021] Ayr containing the dust attracted through the suction duct 11 is removed in dust by electrostatic filter 6B for suction, and is discharged outside as pure Ayr.

[0022] After a dust removal activity is completed, the door 8 for discharge can open and an assembly 2 is carried like the next manufacture erector.

[0023] Drawing 4 illustrates the pressure variation ( drawing 4 (b) ) in the dust removal room 4 to the Ayr intermittent injection ( drawing 4 (a) ) by the Ayr injection means 5, and floating change ( drawing 4 (c) ) of the amount of dust with time. Here, the suction means 6 is drawing in continuously, as shown in drawing 4 (d). If the pressure in the dust removal room 4 repeats change between five atmospheric pressures and two atmospheric pressures by this injection, it is behind for a while from the early stages of the Ayr injection, the pressure of four dust removal increases and the Ayr injection is stopped as it is shown in drawing 4 (b), when Ayr injection of a pressure higher than positive pressure is performed intermittently, as shown in drawing 4 (a), a pressure will become weaker quickly. Moreover, if Ayr of a predetermined pressure is injected by the assembly 2, the dust adhering to an assembly 2 will have danced in the air. drawing 4 (c) is boiled by the with a predetermined pressure [ first ] Ayr injection, makes 100% the number of dust which is danced and raised in the air and floats, and the amount of suspended particles which changes with the repeats of the Ayr intermittent injection of a pressure higher than positive pressure is shown. In this drawing 4 (c), as for a continuous line, particle size shows the ratio of less than (for example, 10 micrometers) 20-micrometer dust, and, as for the broken line, particle size shows the ratio of dust 20 micrometers or more.

[0024] Since the dust adhering to the front face of an assembly 2 will have danced in the air if Ayr of a pressure higher than positive pressure is injected by the front face of an assembly 2 as shown in drawing 4 (c), if a little rate of dust suspension rises and the Ayr injection is stopped after that, the rate of dust suspension will change it to reduction by suction of the dust by the suction means 6. Since the eddy of the air by injection occurs, before the rate of dust suspension changes to reduction immediately after the Ayr injection, it will take time amount for

a while. Since the dust which sedimented on the front face of an assembly 2 at the time of the next Ayr injection has danced in the air again, the rate of dust suspension rises, but since remarkable dust is attracted by the suction means 6 in the case of the 1st injection, the rate of increase decreases compared with the increment in the number of dust by the last injection. Thus, by repeating the Ayr intermittent injection of a pressure higher than positive pressure, the value of the rate of dust suspension decreases gradually, and the dust adhering to the front face of an assembly 2 is removed.

[0025] Compared with less than 20-micrometer dust, as for dust 20 micrometers or more, the rate of dust suspension decreases [ particle size / particle size ] by the Ayr intermittent injection of the small count of a repeat. It is because the dust with a big particle size tends to sediment compared with dust with a small particle size, and it is easy to ride the flow of the air by the suction means 6, so suction effectiveness becomes high.

[0026] By the conventional approach of injecting Ayr continuously, removal can remove efficiently dust with a difficult particle size of less than 20 micrometers by performing intermittently Ayr injection of a pressure higher than positive pressure so that clearly from this drawing 4.

[0027] As mentioned above, although considered as the configuration which attracts Ayr in the dust removal room 4 continuously with the suction means 6 irrespective of under the Ayr injection and a pause with the operation gestalt of this invention, you may make it attract Ayr in the dust removal room 4 by the suction means 6 only during the pause of the Ayr injection.

[0028]

[Effect of the Invention] Since the dust stripper concerning this invention was made to make an assembly inject Ayr intermittently with the Ayr injection means as explained above By being able to put efficiently the dust danced in the air from the assembly on the flow of the air by the suction means, and repeating this intermittent Ayr injection In the conventional continuous Ayr injection, removal does so the effectiveness that removal of dust with a difficult particle size of less than 20 micrometers becomes easy.

---

[Translation done.]

\* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\*\* shows the word which can not be translated.

3.In the drawings, any words are not translated.

---

DESCRIPTION OF DRAWINGS

---

[Brief Description of the Drawings]

[Drawing 1] It is the top view of the dust stripper concerning this invention.

[Drawing 2] It is the side elevation of the dust stripper concerning this invention.

[Drawing 3] It is drawing showing an example of an assembly, and is the outline perspective view of the reading section which can be set like an erector.

[Drawing 4] It is drawing showing the relation between the dust removal internal pressure force over the intermittent injection of Ayr of a predetermined pressure, and the rate of dust removal house dust dust suspension.

[Description of Notations]

1 -- Dust stripper body

2 -- Assembly

4 -- Dust removal room

5 -- The Ayr injection means

6 -- Suction means

10 -- Open air inhalation means

---

[Translation done.]



## \* NOTICES \*

JPO and NCIP are not responsible for any damages caused by the use of this translation.

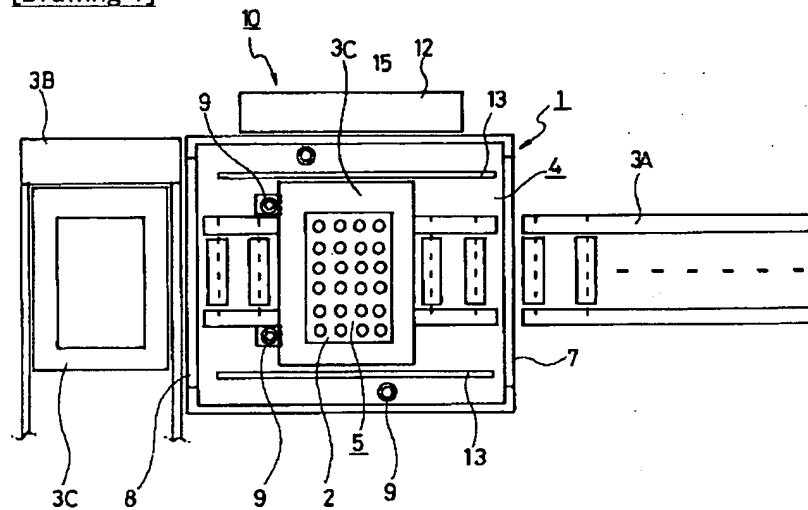
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.\*\*\* shows the word which can not be translated.

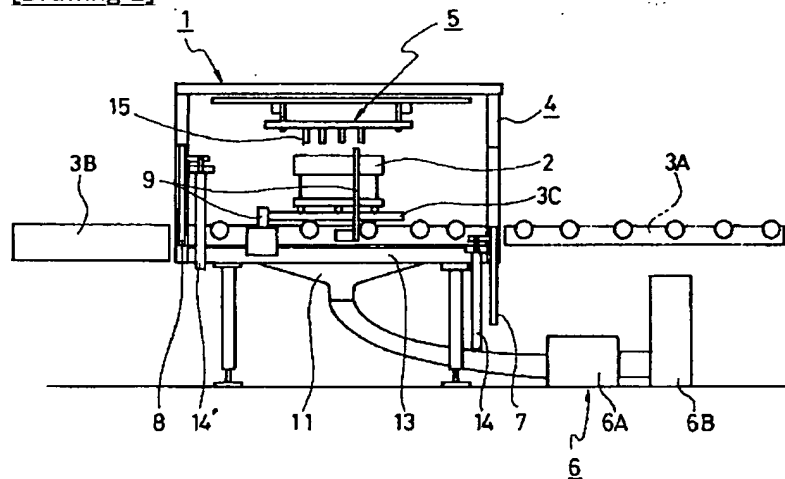
3.In the drawings, any words are not translated.

## DRAWINGS

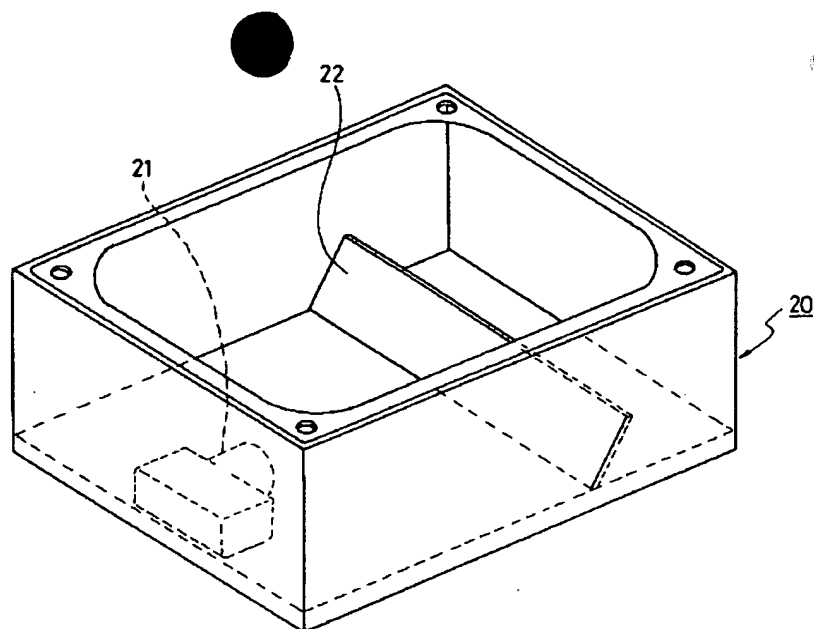
[Drawing 1]



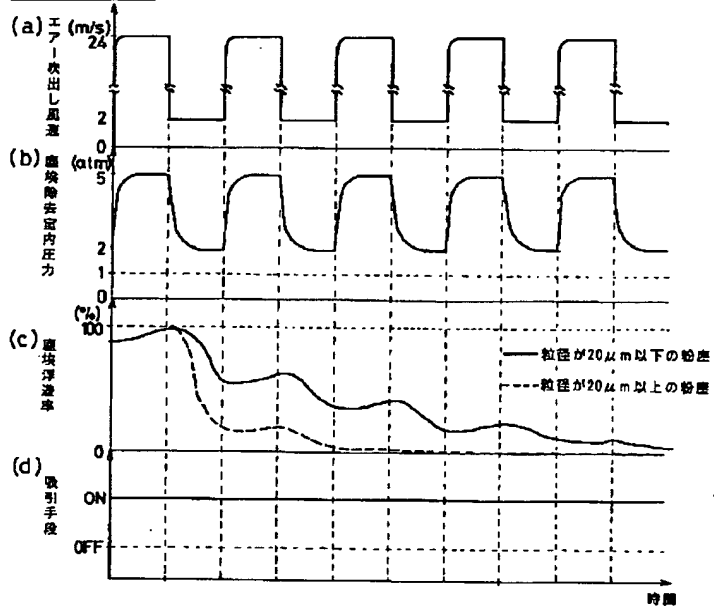
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平11-319740

(43) 公開日 平成11年(1999)11月24日

(51) Int.Cl.<sup>6</sup>

識別記号

F I

B 0 8 B 5/00

B 0 8 B 5/00

A

審査請求 未請求 請求項の数6 OL (全 6 頁)

(21) 出願番号 特願平10-130408

(22) 出願日 平成10年(1998) 5月13日

(71) 出願人 000006747

株式会社リコー

東京都大田区中馬込1丁目3番6号

(72) 発明者 荒明 正春

東京都大田区中馬込1丁目3番6号 株式会社リコー内

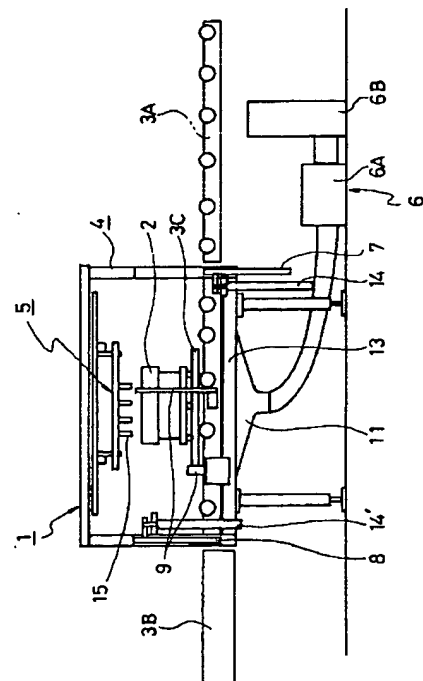
(74) 代理人 弁理士 西脇 民雄

(54) 【発明の名称】 塵埃除去装置

(57) 【要約】

【課題】従来の連続的エアースプレーでは除去が困難な20 $\mu$ m未満の塵埃を容易に除去できる塵埃除去装置を提供する。

【解決手段】本願発明の塵埃除去装置1は、組立体2に付着した塵埃を吹き飛ばすために組立体2に対してエアースプレーノズル15から所定圧力のエアースプレーを間欠的に噴射するエアースプレー噴射手段5と、エアースプレーにより組立体2から空中に舞い上げられた塵埃を吸引する吸引手段6とを備えている。



**【特許請求の範囲】**

【請求項 1】組立体に付着した塵埃を吹き飛ばすために前記組立体に対してエアノズルから所定圧力のエアを間欠的に噴射するエア噴射手段と、エア噴射により前記組立体から空中に舞い上げられた塵埃を吸引する吸引手段とを備えた塵埃除去装置。

【請求項 2】前記吸引手段は、前記エア噴射の休止時に浮遊する塵埃を吸引するために、前記組立体の下方に前記吸引手段の吸引口が設けられていることを特徴とする請求項 1 に記載の塵埃除去装置。

【請求項 3】前記組立体に付着した塵埃を除去するために周囲に対して前記組立体を隔絶する塵埃除去室と、前記組立体を前記塵埃除去室に搬入するときに開閉される搬入用扉と、前記組立体を前記塵埃除去室から搬出するときに開閉される搬出用扉と、前記組立体を前記塵埃除去室に搬入・搬出するための搬入・搬出手段とを備えている請求項 1 又は請求項 2 に記載の塵埃除去装置。

【請求項 4】浄化された外部空気を導入して前記塵埃除去室を陽圧に維持する外気吸入手段を有することを特徴とする請求項 3 に記載の塵埃除去装置。

【請求項 5】前記エア噴射手段は、イオン化されたエアを前記組立体に噴射することにより前記組立体に付着した塵埃を電氣的に中和させ、前記組立体に付着した塵埃の付着力を弱めることを特徴とする請求項 1 又は請求項 2 に記載の塵埃除去装置。

【請求項 6】前記吸引手段は前記エア噴射の休止時のみ前記塵埃を吸引することを特徴とする請求項 1 又は請求項 2 に記載の塵埃除去装置。

**【発明の詳細な説明】****【0001】**

【産業上の利用分野】この発明は、組立体としての例えば精密機器に付着した塵埃を除去するための塵埃除去装置に関するものである。

**【0002】**

【従来の技術】従来から、組立体としての例えば精密機器の製造・組立工程では、完成品の信頼度、性能を高めるために、製造・組立工程において組立体に付着した  $20\mu\text{m}$  以上の粒径の塵埃を除去している。例えば、複写機等の精密光学機器では、図 3 に概略的に示す読み取り部 20 のレンズユニット 21 に高解像度の CCD が用いられている。この読み取り部 20 の可動ミラー 22 に塵埃が付着していると、原稿を読み取った際に、可動ミラー 22 に付着した  $20\mu\text{m}$  以上の粒径の塵埃がレンズユニット 21 の 1 次元ライン CCD に結像され、複写物に筋状の縞が発生し、原稿読み取り品質が低下するという問題がある。そのため、読み取り部 20 の組立工程では、図示を略すコンタクトガラスを装着する前に、可動ミラー 22、レンズユニット 21 に付着した塵埃を除去するために、一定圧力のエアを連続的に可動ミラー 22 の表面、レンズユニット 21 の対物レンズの表面に噴

射して、可動ミラー 22、レンズユニット 21 に付着した塵埃を吹き飛ばすと共に、空中に舞い上げられた塵埃を吸引して、組立体から極力塵埃を取り除くようにしている。

**【0003】**

【発明が解決しようとする課題】ところで、近時、読み取り精度のより一層の向上を図るために、 $20\mu\text{m}$  未満の粒径のものも、極力除去するようにとの要求が高まりつつある。ところが、粒径が  $20\mu\text{m}$  未満の塵埃は、従来のエア連続噴射による塵埃除去では、吸引手段による空気の流れに乗りにくく、空中に舞い上げられた塵埃がエア噴射によって生じる空気の渦（乱流）に乗って組立体上方の空中を浮遊する状態となるため、吸引手段によりなかなか吸引されず、再び組立体に向かって落下して付着する不都合がある。

【0004】この発明は上記の事情に鑑みてなされたもので、組立体に付着している粒径の小さな塵埃を効率よく除去することのできる塵埃除去装置を提供することを目的とする。

**【0005】**

【課題を解決するための手段】この目的を達成するため請求項 1 の塵埃除去装置は、組立体に付着した塵埃を吹き飛ばすために前記組立体に対してエアノズルから所定圧力のエアを間欠的に噴射するエア噴射手段と、エア噴射により前記組立体から空中に舞い上げられた塵埃を吸引する吸引手段とを備えている。

【0006】請求項 2 の塵埃除去装置は、請求項 1 の塵埃除去装置において、前記吸引手段に前記エア噴射の休止時に浮遊する塵埃を吸引するために、前記組立体の下方に前記吸引手段の吸引口が設けられていることを特徴とする。

【0007】請求項 3 の塵埃除去装置は、請求項 1 又は請求項 2 に記載の塵埃除去装置において、前記組立体に付着した塵埃を除去するために周囲に対して前記組立体を隔絶する塵埃除去室と、前記組立体を前記塵埃除去室に搬入するときに開閉される搬入用扉と、前記組立体を前記塵埃除去室から搬出するときに開閉される搬出用扉と、前記組立体を前記塵埃除去室に搬入・搬出するための搬入・搬出手段とを備えている。

【0008】請求項 4 の塵埃除去装置は、請求項 3 に記載の塵埃除去装置において、浄化された外部空気を導入して前記塵埃除去室を陽圧に維持する外気吸入手段を有することを特徴とする。

【0009】請求項 5 の塵埃除去装置は、請求項 1 又は請求項 2 に記載の塵埃除去装置において、前記エア噴射手段がイオン化されたエアを前記組立体に噴射することにより前記組立体に付着した塵埃を電氣的に中和させ、前記組立体に付着した塵埃の付着力を弱めることを特徴とする。

【0010】請求項 6 の塵埃除去装置は、請求項 1 又は

請求項 2 に記載の塵埃除去装置において、前記吸引手段が前記エアークラウドの休止時にのみ前記塵埃を吸引することを特徴とする。

【0011】請求項 1 ～請求項 6 に記載の発明によれば、エアークラウドを間欠的に組立体に向けて噴射することにしたので、エアークラウドによって生じる空気の流れのない状態をエアークラウド休止時に繰り返し発生させることができることになり、従って、吸引手段による空気の流れに乗せて塵埃を吸引できることになる。

【0012】

【発明の実施の形態】以下、本発明の実施の形態を図面に基づいて説明する。

【0013】図 1 及び図 2 において、1 は塵埃除去装置本体、2 は組立体、3 A、3 B は組立体の搬入・搬出手段としての搬送用コンベア、3 C はパレットである。ここでは、所定の工程を経て組立られた組立体 2 はパレット 3 C に乗せられ、搬送用コンベア 3 A によって塵埃除去装置本体 1 に向かって運ばれる。塵埃除去装置本体 1 には、図 2 に示すように塵埃除去室 4、所定圧力のエアークラウドを噴射するエアークラウド噴射手段 5、塵埃除去室 4 内に舞い上げられた塵埃を吸引するための吸引手段 6 が設けられている。

【0014】この塵埃除去室 4 には、搬入用扉 7、搬出用扉 8、搬入物検出器 9、外気吸入手段 10、吸引手段 6 に通じる吸引ダクト 11 が設けられている。この搬入用扉 7 及び搬出用扉 8 はドア開閉用シリンダ 14、14' により開閉される。

【0015】外気吸入手段 10 は、塵埃除去室 4 の側方に設置されている。この外気吸入手段 10 は静電フィルター 12 を備え、外気は図示を略す外気吸入口から外気吸入用ファンにより塵埃除去室 4 に送り込まれ、その際に静電フィルター 12 により塵埃が除去される。この外気の導入により、塵埃除去室 4 は外気圧よりも若干高い圧力、すなわち陽圧に保たれ、塵埃除去室 4 を気密構造としなくとも外部の塵埃が塵埃除去室 4 に侵入しない状態に保つことができる。

【0016】吸引ダクト 11 は塵埃除去室 4 内の下方に設けられている。この吸引ダクト 11 は、下方に向かって吸引口の開口面積が縮径されたラッパ形状とされて、吸引手段 6 に連通されている。吸引手段 6 は吸引用モーター 6 A と吸引用静電フィルター 6 B とを有する。吸引ダクト 11 の近傍には吸引時の空気の流れを防ぐため、整流板 13 が設けられている。

【0017】外気吸入手段 10 による空気の流れと吸引手段 6 による空気の流れとにより、塵埃除去室 4 内には一定の空気の流れが作られている。この空気の流れに空気を漂う塵埃を乗せることにより塵埃の除去が行われる。ここでは、風速（流速）1.2 m/s ～ 1.8 m/s の空気の流れとしている。

【0018】塵埃除去室 4 内には、搬入物の有無、搬入

位置の確認用の搬入物検出器 9 が設けられている。搬入用扉 7 は、組立体 2 が正常に搬入されて所定位置に静止されたことが搬入物検出器 9 により検出されると閉じられる。

【0019】エアークラウド噴射手段 5 は、塵埃除去室 4 の上方に固定されている。このエアークラウド噴射手段 5 には、エアークラウドノズル 15 がここでは 4 本を一組として 6 列設けられており、このエアークラウドノズル 15 から陽圧よりも高い圧力のエアークラウドが組立体 2 に対して噴射される。エアークラウド噴射手段 5 には図示を略すイオンナイザーが設けられており、噴射されるエアークラウドを、+、- にイオン化させることにより塵埃を電氣的に中和して、組立体 2 の表面、例えば、可動ミラー 22 の表面、レンズユニット 21 の対物レンズの表面に付着した塵埃の付着力を弱めている。ここでは、イオン化された陽圧よりも高い圧力のエアークラウドがエアークラウドノズル 15 から組立体 2 に対して最大 24 m/s の流速で噴射される。この噴射は間欠的であり、噴射休止時には外気吸入手段 10 と協力して塵埃除去装置 4 内を陽圧を維持するために、流速 2 m/s 程度のエアークラウドがエアークラウドノズル 15 から送り出される。

【0020】陽圧よりも高い圧力のエアークラウドが組立体 2 に噴射されると、このエアークラウドにより組立体 2 の表面に付着した塵埃が空中に舞い上げられる。このエアークラウドはイオン化されているため、組立体 2 の表面に付着している塵埃は電氣的に中性となり、組立体 2 の表面から離れ易くなる。このエアークラウド噴射により空中に舞い上げられた粒径が 20 μm 以上の比較的大きな塵埃は、エアークラウド噴射による空気の流れの発生の際でも吸引手段 6 による空気の流れに乗って沈降しやすく、塵埃除去室 4 の下部に設けられた吸引ダクト 11 を通って吸引手段 6 により除去される。粒径が 20 μm 未満の塵埃は噴射によって生じる空気の流れに乗って浮遊してなかなか降下しないものが多いが、エアークラウド噴射手段 5 によるエアークラウド噴射を休止して空気の流れが消滅すると、外気吸入手段 10 と吸引手段 6 とにより生じる一定の空気の流れに乗って吸引ダクト 11 を通り、吸引手段 6 によって回収される。続いて、次のエアークラウド噴射を行なう。

【0021】吸引ダクト 11 を通って吸引された塵埃を含んだエアークラウドは、吸引用静電フィルター 6 B により塵埃を除去されて清浄なエアークラウドとして外部に排出される。

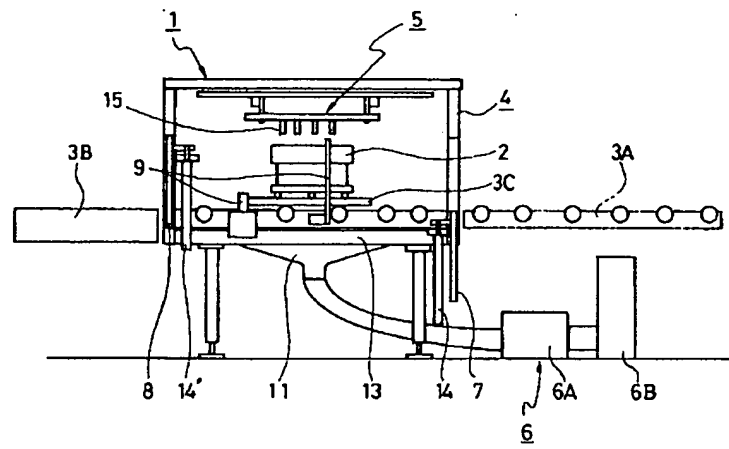
【0022】塵埃除去作業が終了すると排出用扉 8 が開けられ、組立体 2 は次の製造組立工程に運ばれる。

【0023】図 4 はエアークラウド噴射手段 5 によるエアークラウド間欠噴射（図 4（a））に対する塵埃除去室 4 内の圧力変化（図 4（b））及び浮遊する塵埃量の変化（図 4（c））を経時的に例示したものである。ここでは、吸引手段 6 は図 4（d）に示すように連続して吸引を行っている。陽圧よりも高い圧力のエアークラウド噴射が図 4（a）に示すように間欠的に行われると、図 4（b）に示すように、この噴射により塵埃除去室 4 内の圧力が 5 気圧か

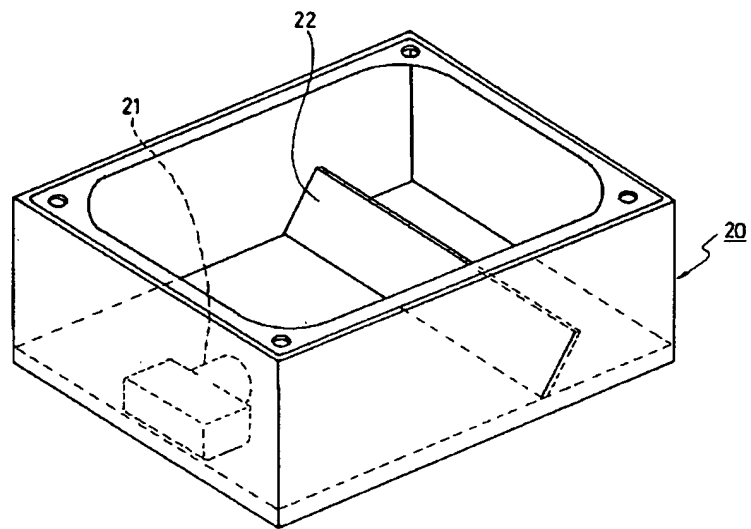
- 1…塵埃除去装置本体
- 2…組立体
- 4…塵埃除去室
- 5…エア一噴射手段
- 6…吸引手段
- 10…外気吸入手段

FIG. 1 is a schematic cross-sectional view of a device assembly. The assembly includes a main housing (1) with a front panel (3A) and a rear panel (3B). Inside the housing, there is a central component (2) with a grid of circular elements (5). This component is mounted on a base (4) and is surrounded by a frame (13). A top cover (10) is positioned above the central component. Various other parts are labeled with numbers: 3C, 8, 9, 12, 15, and 13.

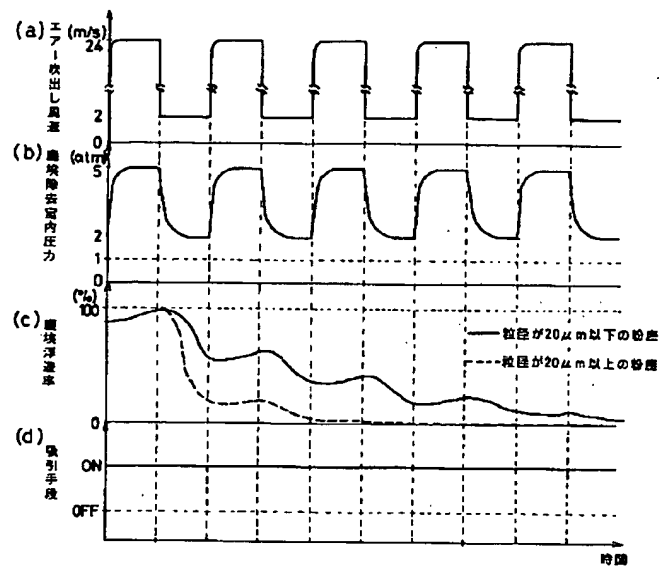
【図 2】



【図 3】



【図4】





**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**